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PROCESS FOR THE PRODUCTION OF A POLYMER SOLUTION

(55) Polymer solution; cellulose; amine oxide; stabiliser; surface-active substances; surfactants; ethoxylated amines; regenerated cellulose yarns; regenerated cellulose films

(57) The invention relates to a process for the production of a polymer solution of cellulose, amine oxide, water and stabiliser, which solution can be processed in the synthetic fibre and polymer film industry to form uniform regenerated cellulose yarns and films with a high degree of fineness. The polymer solution consists of 5 - 20 parts by weight of cellulose, expressed in %, 95 - 80 parts by weight of amine oxide, expressed in %, with 10 - 18 parts by weight of water, expressed in %, 0.1 - 1.0 parts by weight of stabiliser, expressed in % based on cellulose and, according to the invention, contains 0.05 - 5.0 parts by weight of a surface-active substance, expressed in % based on the cellulose. Ethoxylated amines are used as surface-active agents (surfactants).

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CLAIMS

1. A process for the production of a polymer solution of cellulose, amine oxide, water and stabiliser by extruding a homogeneous mixture consisting of 5 - 20 parts by weight of cellulose, expressed in %, 95 - 80 parts by weight of amine oxide, expressed in %, with 10 - 18 parts by weight of water, expressed in %, and 0.1 - 1.0 parts by weight of stabiliser, expressed in % based on cellulose, characterised in that the homogeneous mixture simultaneously contains 0.05 - 5.0 parts by weight of a surface-active agent, expressed in % based on cellulose.

2. The process according to claim 1 characterised in that a non-ionic ethoxylated amine is used as surface-active substance.

FIELD OF APPLICATION OF THE INVENTION

The invention relates to a process for the production of a polymer solution of cellulose, amine oxide, water and stabiliser which is processed in the synthetic fibre and polymer film industry to form regenerated cellulose fibres and films.

CHARACTERISTICS OF THE KNOWN STATE OF THE ART

It is well known that polymer solutions consisting of cellulose, amine oxides and water can be produced and processed to form regenerated cellulose yarns and films (DE-OS 2 830 683/84/85, DE-OS 2 848 471, DE-OS 2 913 589, DE-OS 3 021 043). Moreover, it is known that the polymer solutions of cellulose can be stabilised against polymer degradation by means of additives such as e.g. gallic acid propyl ester and substituted phenols (DE-OS 3 034 685, EP 0 047 929, DD - PS 229 708). The above average viscoelastic properties of the polymer solution and its relatively high interfacial tensions limit its spinning performance, i.e. the yarn formation is limited regarding its evenness and fineness (compare Navard, P. and Haudin, I., Polymer Process Eng. 3 [1985], pages 291 - 301).

Improvements particularly regarding the achievable fineness are achieved by spinning the polymer solution at very low shear rates and with long residence times in the spinneret channel. This leads to a reduction in the rate of throughput per spinneret.

AIM OF THE INVENTION

The aim of the invention consists of a simple process for the production and spinning of polymer solutions of cellulose, amine oxides, water and stabiliser to form even regenerated cellulose yarns of high fineness.

PRESENTATION OF THE ESSENCE OF THE INVENTION

The object of the invention consists of spinning regenerated cellulose yarns with a much higher evenness and fineness while eliminating the above-mentioned defects. According to the invention, this is achieved by forming a polymer solution consisting of 5 - 20 parts by weight of cellulose, expressed in %, 95 - 80 parts by weight of amine oxide, expressed in %, with 10 - 18 parts by weight of water, expressed in %, 0.1 - 1.0 parts by weight of stabiliser, expressed in % based on cellulose, and 0.05 - 5.0 parts by weight of a surface-active agent (surfactant), based on cellulose, through a spinneret to form a yarn sheet, orienting the yarns and subsequently regenerating the cellulose in water and/or aqueous amine oxide solutions.

As a result of the addition of the surface-active substance, preferably an ethoxylated amine, the interfacial tension of the polymer solution is greatly reduced, a cohesion rupture of the elementary yarns at the spinneret capillary outlet is prevented and consequently the spinning performance increased. N-methyl morpholine-N-oxide can be used as amine oxide.

PRACTICAL EXAMPLES

The invention is to be illustrated in the following by examples:

Example 1

A homogeneous mixture of 10.0 parts by weight of cellulose (DP 400), expressed in %, 90.0 parts by weight of N-methyl morpholine-N-oxide, expressed in %, with 14.4 parts by weight of water, expressed in %, 0.4 parts by weight of

stabiliser (2,6-di-tert. butyl-p-cresol), expressed in % based on cellulose, and 0.1 parts by weight of ethoxylated amine (Präwozell N9), expressed in % based on cellulose, is passed to a double screw extruder, melted, degasified, filtered and formed through a spinneret with 60 spin capillaries at 368K to form an elementary fibre bundle. After drawing in an air gap, the elementary fibre bundle passes through a spinning bath at 60 m/min and is subsequently cut into staples 38 mm in length, washed, finished and dried.

Fibre parameters	
Fineness	0.15 tex
Yield stress	290 mN/tex
Elongation at break	14 %

Example 2

A homogeneous mixture with 1.0 parts by weight of ethoxylated amine (Präwozell P76/1), expressed in %, is processed in the same was as in example 1 at a take-off speed of 80 m/min.

Fibre parameters	
Fineness	0.12 tex
Yield stress	350 mN/tex
Elongation at break	13 %

Example 3

A mixture of 12.5 parts by weight of cellulose (DP-350), expressed in %, 87.5 % by weight of N-methyl morpholine-N-oxide, expressed in %, with 13.1 parts by weight of water, expressed in %, 0.2 parts by weight of stabiliser (gallic acid propyl ester), expressed in % based on cellulose, with 0.5 parts by weight of ethoxylated amine (Präwozell N9), expressed in % based on cellulose, is introduced into a

stirred vessel, stirred for one hour at 363K under vacuum (13 KPa) until dissolved completely and subsequently formed into fibre bundles via a spinning pump, filter and spinneret (36 capillaries). Stretching of the elementary yarns in an air gap, regeneration of the cellulose, removal of the solvent, finishing, drying and reeling of the multifibre yarn takes place.

Yarn parameters	
Fineness	12 tex (36)
Yield stress	250 mN/tex
Elongation at break	20 %